



# *Smarter Consumers Smarter Grids*

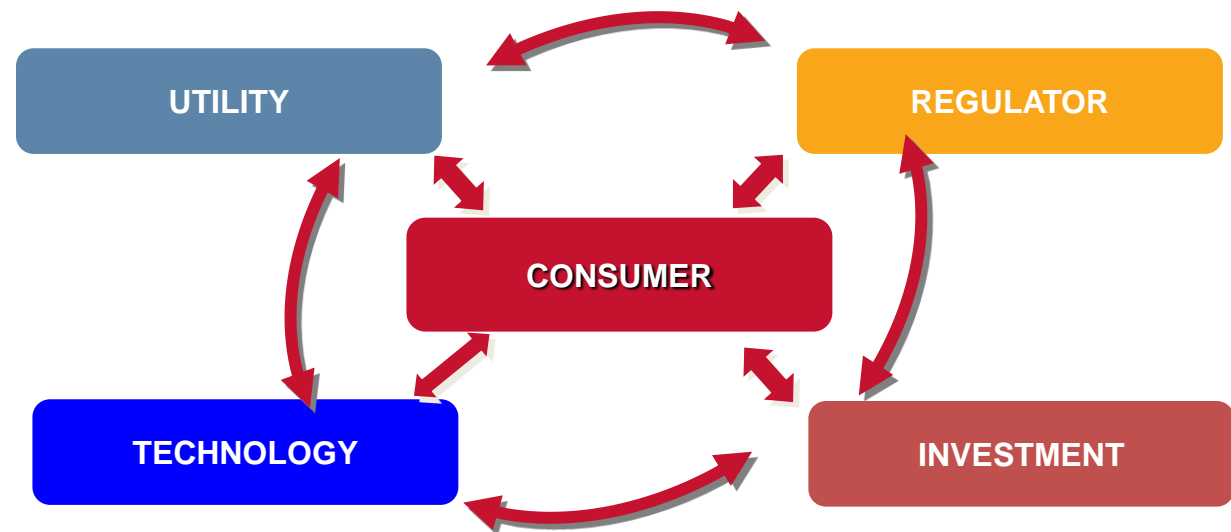
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**AREVA T&D**

# Smarter Grid Context

- Smarter Grid is about empowering consumer choice
  - Consumers want better electric reliability
  - Consumers want more energy efficient homes
  - Consumers want more choice in green energy
  - Consumers want more green transportation
  - Consumers want a sustainable environment

These choices will impact the entire Electric Grid in ways we have never imagined before with new Challenges & Opportunities



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# Smarter Grid Challenges

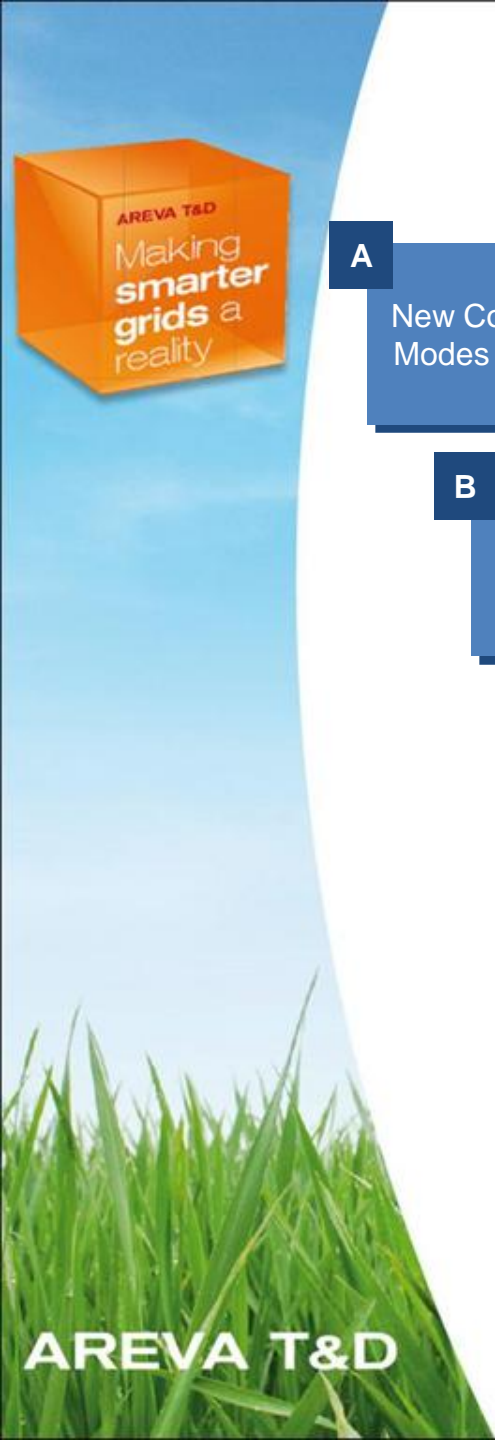


- **Improving System Reliability**
  - **Lights-On..**
- **Improving Operational Efficiency**
  - **Lights-On at the lowest cost**
- **Improving Consumer Participation (DR)**
  - **Inform customers in real-time about price**
- **Improving Distributed Generation Participation**
  - **Enable more localized generation by the customer or closer to the customer**
- **Improving Renewable Generation Participation**
  - **Enable more renewable generation**
- **Enhanced Interoperability & Standards**
  - **Integrating consumer appliances with electrical devices**
- **Enhanced Cyber Security**
  - **Protection of consumer data & critical infrastructure**



# Smarter Consumers

## Passive to Active Grid Management



A

New Consumption  
Modes & Services

- Smart Appliances/Services
- Smart Homes & Buildings
- $\mu$ -Production &  $\mu$ -Grid
- Demand Response
- PHEV

B

Distribution  
Optimization

- Renewable Energy & Demand Response
- Electrical & Communication Infrastructure
- Electric Losses & Customer Outages

C

Transmission  
Optimization

- Renewable Energy
- Electrical & Communication Infrastructure
- Grid Stability & Reliability

D

Renewable Energy

- Centralized & Decentralized Renewables
- Micro-Renewables
- Energy Storage

E

Electric Markets

- Demand Response
- Energy Efficiency

### Challenges

Data to Info  
for Improved  
Visibility

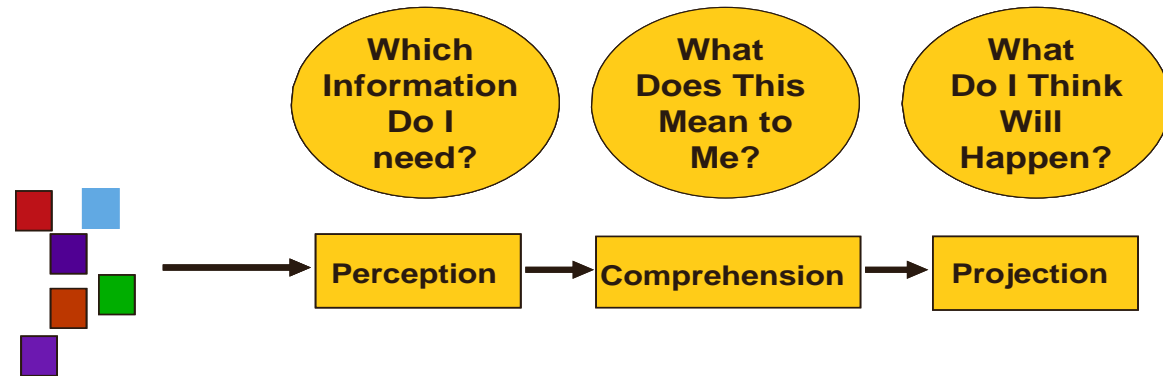
Localized  
Decision  
Making

Interoperability

Cyber Security

Consumer  
Participation  
in Grid Mgmt

# Comprehensive Situation Awareness



- **Benefits of Situation Awareness**
  - Coordinated switching for true self healing
  - Coordinated reactive power support for increase wind energy penetration
  - Coordinated loss optimization for improved energy efficiency
  - Comprehensive training for routine & emergency scenarios including fault simulation & restoration
  - Coordinated outage planning & asset management
  - Coordinate consumer load management (Demand Response)
  - Improved asset utilization & delay capital investments

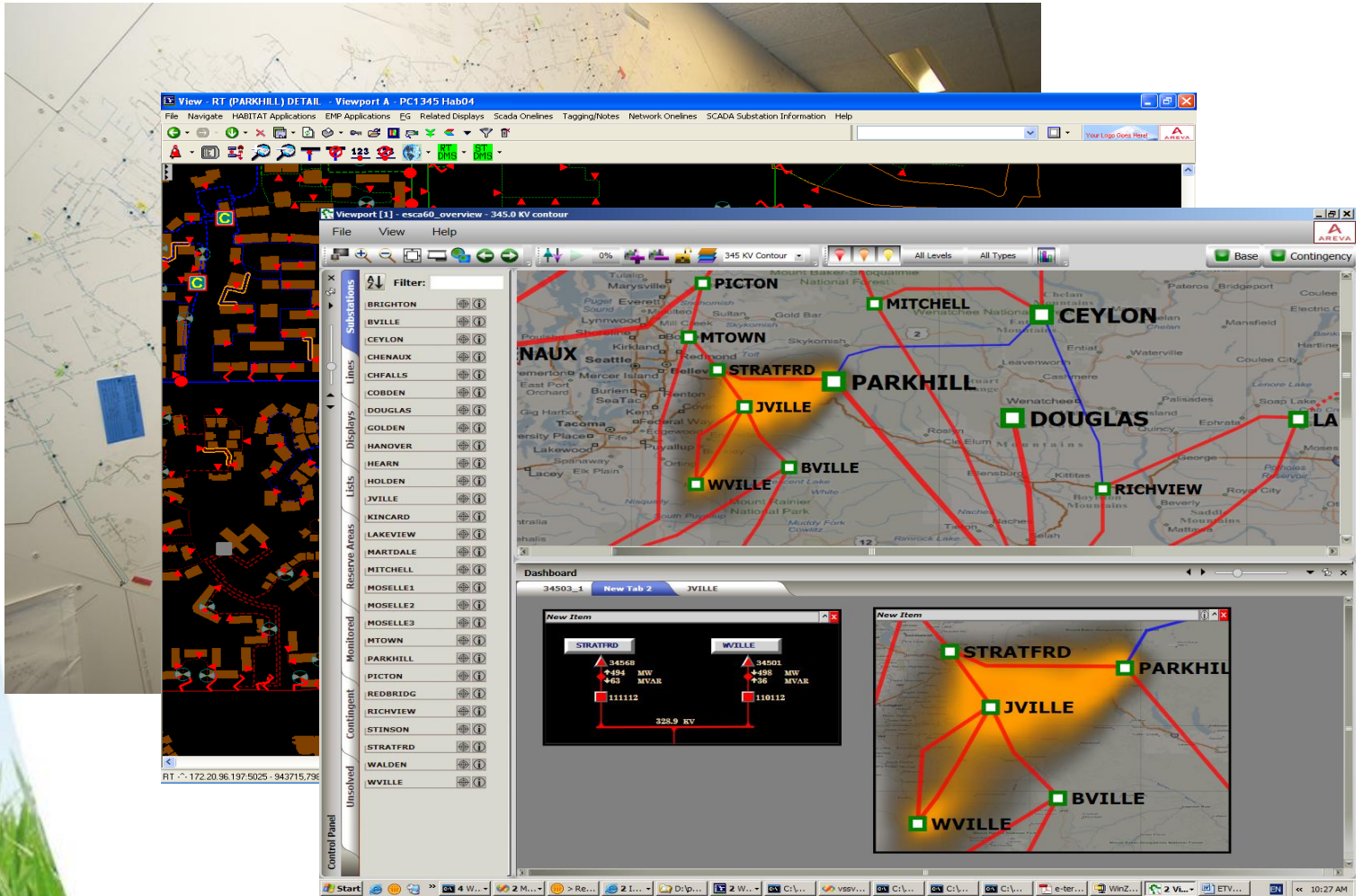
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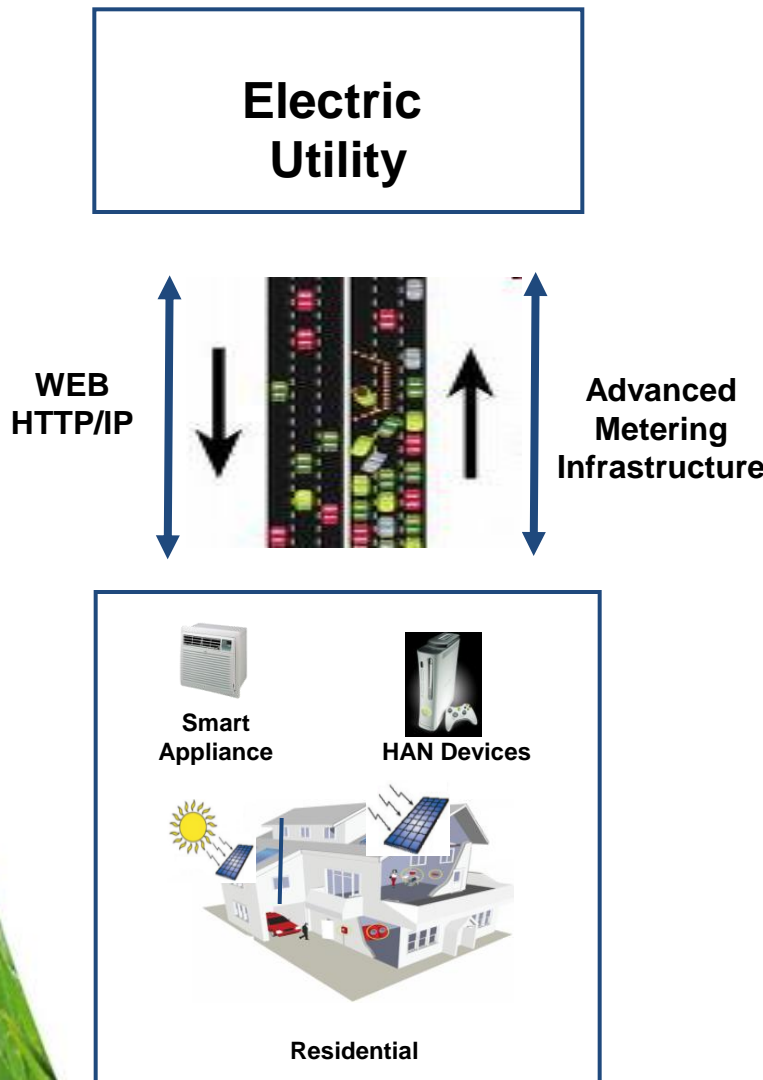
# Situation Awareness Examples

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# Smart Grid Data Paths



- **Challenges ...**

- How to empower the Consumer through sharing of grid data ?
- How to improve Grid operations with Consumer data ?

- **Solution ...**

- Home Energy Portal
- Home Energy Box
- IP Enabled Smart Appliances
- Energy Usage, CO<sub>2</sub>, Gen Mix, Price, Weather, Historical & Future
- Demand Response & Monitoring (Advance Load Modeling)

# Summary



- “What is “deep-area situational awareness” & why is it important?”
  - Improved information will enhance grid operations
  - How deep shall we go, why stop at the Substation ?
  - Informed Consumers & Smarter Distribution Grids can significantly enhance electric grid operations
- “How can Smart Grid improve the flow of information from the distribution to the transmission grid ? ”
  - Interoperable & secure devices & standards are key
  - Enhance innovation in new devices & services
  - Utilize all non-AMI communication paths
- Leading Utilities have seen these benefits & reorganized to remove operational obstacles

**SMARTER UTILITY .....**

